METHOD, SYSTEM AND DEVICE FOR REDUCING INTERFERENCE BETWEEN A FIRST AND A SECOND DIGITAL SUBSCRIBER LINE

[0001] The invention relates to a method and to a device for reducing interference between a first and a second digital subscriber line. A corresponding communication system is also provided.

[0002] DSL (Digital Subscriber Line), or xDSL, is a family of technologies that provide digital data transmission over the wires of a local telephone network. It is mostly used for transmission of data to and from the subscriber/customer (or the customer premises equipment—CPE, respectively) to the central office side of the communications network.

[0003] As high speed internet access is gaining more and more importance data access for homes (and businesses) is often realized via said xDSL services used on existing copper lines. Furthermore, other applications also emerge that require broadband data transmission services. E.g., so-called triple play services offer subscriber access to Internet, TV and voice data transmission. Especially, the transmission of TV data is a bandwidth consuming application. One HDTV channel, for example, requires a data rate amounting to 12 Mbit/s. These higher transmission rates have to be provided and covered by xDSL technologies.

[0004] As requirements for high speed Internet access are increasing, operators are also optimizing services that are offered to their customers. This becomes a difficult task as an increasing amount of users as well as high data rates lead to higher crosstalk in-between subscriber lines, especially in the same cable binder: In most cases multiple subscriber lines share—at least partly—the same cable binder. In a suchlike cable binder multiple lines are installed together. This leads to an increased mutual influence between these subscriber lines, resulting in more crosstalk and interference on the transmission path.

[0005] Crosstalk can be divided into two different types: "near end crosstalk" (NEXT) which is interference between two pairs in a cable measured at the same end of the cable as the transmitter and "far end crosstalk" (FEXT) that can be defined as interference between two pairs of a cable measured at the other end of the cable from a transmitter.

[0006] Overall crosstalk has to be regarded as one of the most grievous problems in DSL environments causing interference and disturbances in the transmission lines which, in turn, leads to a significant degradation in the system performance.

[0007] The problem to be solved is to overcome the disadvantages described above and in particular to provide a functionality that decreases the negative impacts of crosstalk interference.

[0008] This problem is solved according to the features of the independent claims. Further embodiments result from the depending claims.

[0009] In order to overcome this problem a method for reducing interference between a first and a second digital subscriber line (DSL) is provided, the method comprising the steps of determining line characteristics of the second DSL and reducing a transmission power of the first DSL based on the line characteristics of the second DSL.

[0010] By examining the line characteristics of a further transmission line, the DSL transmission on a first line may be advantageously organized such that the influences of the first DSL on the second DSL are minimized.

[0011] In a further embodiment the determination of the line characteristics of the second DSL may be performed by means of a line testing method.

[0012] As methods for line testing may be implemented for the training of DSL transceivers this line testing functionality could be advantageously used for determining the line characteristics of a further transmission line.

[0013] Furthermore, the determination of the line characteristics of the second DSL may be performed by means of a "dual-ended line testing" method (DECT).

[0014] In a further embodiment the reduction of the transmission power of the first DSL may be performed in at least one frequency spectrum. Advantageously, a certain frequency spectrum having a particular negative impact may be masked out, for example.

[0015] The at least one frequency spectrum may furthermore be determined based on the line characteristics of the second DSL.

[0016] Moreover, in an embodiment the line characteristics of the second DSL may comprise a line attenuation. By determining the attenuation of the second line the frequencies used for DSL transmission in the second DSL could be identified.

[0017] The frequency spectrum that is defined for reducing the transmission power my furthermore be determined based on the line attenuation of the second DSL.

[0018] In a further embodiment the transmission power of the first DSL may be reduced in the context of a power back off method.

[0019] Furthermore, the problem stated above is solved by a communication system arranged such that all steps of a method according to any of the method claims can be performed.

[0020] The problem stated above is also solved by a device comprising means for reducing interference between a first and a second digital subscriber line, DSL, by reducing a transmission power of the first DSL based on line characteristics of the second DSL.

[0021] According to a next embodiment, the device may further comprise means for performing a line testing method for determining the line characteristics of the second DSL.

[0022] The device may further comprise means for receiving the line characteristics determined by or in collaboration with a further device.

[0023] Furthermore, the device may be a digital subscriber line access multiplexer.

[0024] It is further noted that in an embodiment the device may be designed as a processing unit. The processing unit may comprise at least one, in particular several means that are arranged to execute the steps of the methods described herein. The means may be logically or physically separated; in particular several logically separate means could be combined in at least one physical unit.

[0025] Moreover, the processing unit may comprise at least one of the following: a processor, a microcontroller, a hard-wired circuit, an ASIC, an FPGA, a logic device.

[0026] The solution provided herein further comprises a computer program product directly loadable into a memory of a digital computer, comprising software code portions for performing the steps of the method as described herein.

[0027] In addition, the problem stated above may be solved by a computer-readable medium, e.g., storage of any kind, having computer-executable instructions adapted to cause a computer system to perform the methods as described herein.